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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,985	03/24/2004	Nobukazu Ikoma	789_128	8509

25191 7590 09/24/2007

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EXAMINER	
MERKLING, MATTHEW J	
ART UNIT	**PAPER NUMBER**
1764	
MAIL DATE	**DELIVERY MODE**
09/24/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/807,985	IKOMA ET AL.	
	Examiner	Art Unit	
	Matthew J. Merkling	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/16/07 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (US 6,348,141) in view of Atsumi (US 2003/0121782) and Dillon (US 4,040,930).

Regarding claim 1, Kato discloses a gas sensor comprising a sensor element for measuring a predetermined gas component contained in an introduced measurement gas, and a protective cover (fig. 1) arranged to surround the sensor element; wherein the protective cover includes an inner protective cover (100) for covering at least a forward end portion of the sensor element; an outer protective cover (102) for covering

the inner protective cover; and an intermediate protective cover (104) installed between the inner protective cover and the outer protective cover (col. 2 lines 21-30). Kato also discloses the inner protective cover is formed to have a bottom-equipped cylindrical configuration with an inner gas-introducing hole (106) which is formed at a position opposed to the sensor element and with an inner gas discharge hole (108) which is formed at a bottom portion; the outer protective cover is formed to have a bottom-equipped cylindrical configuration with an outer gas-introducing hole (110) which is disposed at a position not opposed to the inner gas-introducing hole of the inner protective cover; and the intermediate protective cover has an intermediate gas-introducing hole (118) which is disposed at a position not opposed to the inner gas-introducing hole of the inner protective cover and the outer gas-introducing hole of the outer protective cover (col. 2. lines 52-65). Kato also discloses that said inner protective layer includes a plurality of inner gas inlet holes (col. 12 lines 23-26, fig. 1 (106)). Kato also illustrates that the outer protective layer contains a plurality of outer gas inlet holes (col. 12 lines 30-31. fig. 1 (110)). Kato further discloses the distance (L1) from the outer gas inlet holes (110) is greater than the distance (L2) from the intermediate gas inlet holes (118) to the inner gas inlet holes (106), See Fig. 1.

Kato fails to disclose the ratio $A1/A2 \geq 1$, where A1 represents a total opening area of said inner gas inlet holes and A2 represents a total opening area of said outer gas inlet holes.

Atsumi teaches a gas sensor with a protective cover on the end of said gas sensor comprising an inner protective cover (cup, fig. 1 (102)) with gas inlet holes (second gas hole, fig. 1 (104)) and an outer protective cover (cup, fig. 1 (101)) with gas

inlet holes (first gas hole, fig. 1 103)) (paragraph 0009). This gas sensor with protective cover is illustrated in fig. 1. Atsumi also discloses that an area (fig. 5, D1) of the inner gas inlet holes (fig.3, 104) and an area (fig. 5, D2) of the outer gas inlet holes (fig. 3, 103) as both having a range of 1-10 mm^2 with a specific example of these areas as both being 4.9mm^2 (paragraph 41 and 43). Atsumi discloses that there are an equal number, 8, of outer gas inlet holes (first circular gas holes, 103) and inner gas inlet holes (second circular gas holes, 104) (paragraph 0030). This specific example gives an area, D1 (outer gas inlet hole), of 4.9mm^2, which gives a total area (A2, as claimed) of 39.2mm^2, and an area, D2 (inner gas inlet holes), of 4.9mm^2, which gives a total area (A1, as claimed) of 39.2mm^2. This corresponds to a ratio A1/A2 (as claimed) of 1, which reads on the range of claim 1. Atsumi discloses that if D1 is too small the resistance to flow of the gas to be measured into the outer protective cover becomes too large, thus causing a bad influence on the accuracy in detection by the sensor (paragraph 42) and that if D1 is too large, it becomes difficult to cause a delay in the inflow of gas to be measured. Thus, before a fall in an output of the sensor is completed, a rise of the output starts, thus causing a possibility of deteriorating the accuracy in detection (paragraph 42). Atsumi discloses that if D2 is too small the resistance to flow of the gas to be measured into the outer protective cover becomes too large, thus causing a bad influence on the accuracy in detection by the sensor (paragraph 42) and that if D2 is too large, it becomes difficult to cause a delay in the inflow of gas to be measured. Thus, before a fall in an output of the sensor is completed, a rise of the output starts, thus causing a possibility of deteriorating the accuracy in detection (paragraph 44).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Atsumi's sized inner and outer gas inlet holes with the water scattering protective cover of Kato in order to improve the accuracy and water droplet protection of said gas sensor.

Kato also fails to teach that the number of inner gas inlet holes is greater than the number of outer gas inlet holes and the area of each of said inner gas holes is less than the area of each of said outer gas inlet holes.

Dillon also discloses a gas sensor with multiple protective coverings over the sensing element.

Dillon teaches a number of outer gas inlet holes (See Fig. 1 (74)) is less than the number of inner gas inlet holes (perforated sleeve (78)), as well as the area of each of the inner gas holes is less than the area of each of the outer gas holes (See Fig. 1). Dillon teaches this in order to hold a ceramic fiber filter in between two covers in the protective cover and prevent particles and other contaminants from the exhaust stream from damaging the sensor element (col. 1 line 57 – col. 2 line 7, col. 3 lines 9-13).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the smaller area holes and greater number of holes in the inner layer, as in Dillon, with the gas sensor of Kato in order to hold a ceramic fiber filter in between two covers in the protective cover and prevent particles and other contaminants from the exhaust stream from damaging the sensor element.

Regarding claim 4, Kato further discloses the inner gas inlet holes are formed at approximately equal distances circumferentially around the inner protective cover (col. 13 lines 37-42). The inner gas inlet holes are also illustrated in fig. 9 (106).

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (US 6,348,141), Atsumi (US 2003/0121782) and Dillon (US 4,040,930) as applied to claim 1 above, and further in view of Toguchi et al. (US 6,948,353).

The modified Kato teaches all of the claims limitations but does not teach plate sections extending over each of the inner gas inlet holes. Toguchi et al. teaches a gas sensor (fig. 7 (1)) employed in a burning control system for automotive engines to measure the concentration of a gas component, with an inner protective cover (inner cover (2)) and an outer protective cover (outer cover (3)) each with a plurality of inner gas inlet holes and outer gas inlet holes (fig. 12a, (245 and 345, respectively) (col. 1 lines 64-67, col. 2 lines 1-12). Toguchi illustrates said inner cover (fig. 12(b), 247) gas inlet holes (245) as having a portion of a side wall cut and bent inward, preferably in the same orientation, covering said gas inlet hole in order to facilitate the ease of entrance of a measurement gas into a gas chamber (fig. 7 (112)) (col. 13 lines 11-23). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the plate sections over the inner gas inlet holes of Toguchi to the device of the modified Kato in order to ease the entrance of a measurement gas into the gas chamber.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (US 6,348,141), Atsumi (US 2003/0121782) and Dillon (US 4,040,930) as applied to claim 1 above, and further in view of Watanabe et al. (US 6,214,186).

The modified Kato teaches all of the claim's limitations but does not disclose that the inner gas inlet holes are arranged in first, second and nth groups, each on a different circumference of the inner protective cover. Watanabe et al. teaches a gas sensor (fig. 1 (1)) having an outer (fig. 6(a), (21)) and inner (22) protective cover, each with gas inlet holes (211 and 221, respectively) to communicate with a sensor element (fig. 1 (10)) contained inside the inner protective cover (col. 7 lines 13-25). Watanabe also illustrates an inner protective cover (fig. 11 (22)) with a first, second, and nth group of gas inlet holes each located on a different circumference of said inner protective cover and each at regular intervals around each circumference (col. 8 lines 12-15). The arrangement and number of gas inlet holes on the inner protective cover was a variable that was known to have an effect on the response time of the gas sensor at the time of the invention as is shown by Yamada et al. (US 6,279,376) (col. 6 lines 59-62, col. 7 lines 1-3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to increase the number and arrangement of holes of the modified Kato as shown by Watanabe et al. in order to allow for a faster and improved response to changes in a measurement gas.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (US 6,348,141), Atsumi (US 2003/0121782) and Dillon (US 4,040,930) as applied to claim 1 above, and further in view of Young et al. (US 6,071,476).

The modified Kato teaches all of the claim's limitations but does not disclose a perpendicular orientation of the protective cover in relation to the gas tube to which it is installed. Young et al. teaches a gas sensor that can be used in an internal

combustion engine exhaust stream (col. 1 lines 36-42). Young et al. also teaches that the installation of said gas sensor in an orientation substantially perpendicular to the exhaust gas flow results in more reproducible results and minimizes application-to-application variations in sampling and sensor response times, thereby providing accurate evaluation of the catalytic converter (col. 17 lines 6-11). It would have been obvious to one of ordinary skill in the art at the time the invention was made:

a. To install the protective cover of said gas sensor in a substantially identical orientation to the gas tube as the gas sensor itself, and,

b. To combine the perpendicular orientation of the gas sensor of Young et al. and the gas sensor of the modified Kato to improve the reproducibility and minimize the sampling variations in said gas sensor.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (US 6,348,141), Atsumi (US 2003/0121782) and Dillon (US 4,040,930) as applied to claim 1 above, and further in view of Nakamura et al. (US 6,780,298).

The modified Kato teaches all of the claims limitations but does not disclose the inclined orientation of the protective cover. Nakamura et al. teaches a gas sensor that can be used in an internal combustion engine exhaust stream (col. 1 lines 7-9). Nakamura et al. discloses that the inclination of the gas sensor (as well as the protective cover) is a variable that can control the response time and the water splash resistance of said gas sensor. Nakamura teaches that inclining a gas sensor tip end in a downstream direction of a gas flow will slow down the response time of said gas sensor (col. 2 lines 25-27). Nakamura also teaches that inclining the gas sensor tip end in an

upstream direction of said gas flow will deteriorate a water splash resistance of said gas sensor (col. 2 lines 27-29). It would have been obvious to one of ordinary skill in the art at the time the invention was made to install the gas sensor and protective cover of Kato, at an inclination as taught by Nakamura in order to decrease the response time of said gas sensor or to increase the water splash resistance of said gas sensor.

Response to Arguments

8. Applicant's arguments filed 8/16/07 have been fully considered but they are not persuasive.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Merkling whose telephone number is (571) 272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJM

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